PNL ve açık böbrek taşı cerrahisi sonrası rekürrens

Recurrence after PNL and open renal stone surgery

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Geliş tarihi (Submitted): 09.03.2014
Kabul tarihi (Accepted): 23.09.2014

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Özet

Amaç: Nefrolitiazis nedeniyle perkütan nefrolitotripsi (PNL) veya açık cerrahi geçiren hastalarda taş rekürrens oranını karşılaştırmak.

Gereç ve Yöntemler: Ocak 2006-Mayıs 2009 tarihleri arasında cerrahi tedavi uygulanan böbrek taşı tanılı hasta geriye dönük olarak incelendi. Toplam 38 hasta çalışmaya alındı. Grup 1 (n:20) hastaya açık cerrahi uygulanırken Grup 2 (n:18) hastaya ise PNL uygulandı. Cerrahi sonrası non-opak ve rezidü taşı olan hastalar çalışma dışı bırakıldı. Taş taraması için idrar analizi, radyografi ve non-kontrast bilgisayarlı tomografi yapıldı. Hastaların yaş, cinsiyet, hastanede kalış süresi, preoperatif taş yükü, postoperatif takip süresi ve postoperatif taş yükü kaydedildi.

Bulgular: Grup 1 ve grup 2 deki erkek / kadın oranı sırasıyla 11/9 ve 10/8 dir. Yaş ortalaması 1. grupta 41,9 ± 13,58 ve 2. grupta 36,22 ± 14,3 yıl idi. Ameliyat öncesi taş yükü PNL grubunda 329,46 ± 249,66 mm2 iken açık cerrahi grubunda 390,72 ± 200,12 mm^2 idi. Taş rekürrensi açık cerrahi grubunda sadece % 20 iken PNL grubunda % 61olarak saptandı. Ameliyat sonrası kontrollerde taş yükü Grup 2'de Grup 1'e nazaran anlamlı derecede daha yüksek bulundu (p= 0.40).

Sonuç: PNL son zamanlarda böbrek taşı ameliyatları için daha sık kullanılır olmuştur. Taş nüks oranı rezidüel fragmanlar nedeniyle perkütan nefrolitotripsi sonrası artabilir.

Anahtar Kelimeler: PNL, nüks taş, böbrek taşı, perkütan nefrolitotripsi

Abstract

Objective: To compare the rate of stone recurrence in patients who underwent percutaneous nephrolithotripsy (PNL) or open surgery because of nephrolithiasis.

Material and Methods: Between January 2006-May 2009 with diagnosis of nephrolithiasis who underwent surgical treatment were reviewed retrospectively. Totally 38 patients were included to study. Group 1 (n: 20) underwent open surgery, while Group 2 (n: 18) patients underwent PNL. The patients whom have non-opaque and residual stones after surgery were excluded from the study. By the controls urine analysis, plain radiography and non-contrast computer tomography were performed for screening stones. Patients' age, gender, duration of hospital stay, preoperative stone burden, postoperative follow-up period and postoperative stone burden were recorded.

Results: The ratio of male/female in group 1 and group 2 is 11/9 and 10/8 respectively. The mean age was 41,9±13,58 in group 1 and 36,22±14,3 years in group 2. Preoperative stone burden was 329,46±249,66mm2 in PNL group while 390,72±200,12mm2 in open surgery group. Stone recurrence was detected in 61 % (11/18) of the patients treated with PNL, while only in 20 % (4/20) of the patients in the open surgery group. Postoperative control stone burden was significantly higher in group 2 than in group 1 (p=0.40).

Conclusion: PNL has been used more frequently for renal stone surgeries recently. The stone recurrence rate may increase after percutaneous nephrolithotripsy due to insignificant residual fragments.

Key Words: PNL, Stone recurrence, urolithiasis, percutaneous nephrolithotripsy

Introduction

Although in American Urological Association (AUA) and European Association of Urology (EAU) guidelines; extracorporeal shock wave lithotripsy (ESWL) is the first alternative in the management of renal stones, for stones larger than 2cm in diameter which cannot be fragmented because of their hardness, and location, percutaneous nephrolithotripsy (PNL) faces us as the first alternative(1, 2). Therefore, the incidence of open stone surgery which was the gold standard in 1970s has dropped to 1 percent (3, 4). Nowadays, open stone surgery is only applied following - unsuccessful endourological interventions, in complex or recurrent cases which stone clearance is thought to be impossible within an acceptable time frame using only endourological methods (5). Ureteropelvic junction (UPJ) stenosis, complex stones with larger stone burden, non-functional kidney or renal pole, larger obstructive caliceal stones, especially anteriorly located caliceal diverticular stones constitute other indications for open renal surgery (5). Even if PNL operation has found such a larger field of application, still some unanswered questions exist about the issue of stone recurrence (6-12).

Development of stone recurrence is frequently observed in urinary stone disease, and recurrence rates approaching 50 % have been reported within 5-7 years, postoperatively (13-14). In a study comparing patients managed by extracorporeal shock wave lithotripsy (ESWL) or open renal surgery, stone recurrence was found to be 13.9, and 31.8 %, respectively (15). The reason for lower incidence of stone recurrence in ESWL has been stated to be its lower stone burden when compared with the cases operated with open surgery (15). Stone recurrence rates were found to be 0-17%, 22.3%, 27%, and 31.4 % at the end of 1, 2, 3, and 5-years of follow-up (6, 9-12). As stone recurrence rates, urinary system infection, renal failure, smoking habit, anatomic abnormalities, and stone remnants were indicated as the most important factors (16).

In this study, stone recurrence rates in patients who had undergone open renal stone surgery, and PNL were retrospectively investigated. As far as we know, this is the first study comparing stone recurrence rates after these two operations.

Materials and Methods

Patients who had undergone open renal surgery, and PNL operation in our clinics between January 2006, and May 2009 with the diagnosis of renal stone were included in the study. Group 1 consisted of 20 cases who had open renal surgery, and Group 2 included 18 cases who had undergone PNL operation in both groups, cases with solitary renal stones were enrolled in the study. Patients with metabolic disease (hyperparathyroidism), lower urinary system anomalies, and congenital renal anomalies (horseshoe kidney, polycystic kidney, infundibular, and ureteropelvic stricture), those who had undergone combined procedures, and/or cases with non-opaque stones, and postoperative residual stones were not included in the study. In all cases stone-free state was evaluated by direct urinary system radiograms (KUB) obtained on postoperative 1'st day. Age, gender, duration of hospitalization, preoperative stone burden, and follow-up periods of the patients were recorded. In all patients called for a return visit, complete urinalysis, KUB, and non-contrasted spiral computerized tomography (CT) examinations were performed to investigate the occurrence of stone recurrence (if any).

Preoperatively in all cases, complete blood counts, biochemical parameters, bleeding- coagulation values, complete urinalysis, and urine culture findings were evaluated. Preoperatively, all patients were assessed with non-contrasted spiral CT and/or intravenous urography (IVU) so as to determine renal anatomy, and location/ dimensions of stone(s). Cases with positive urine cultures were treated with appropriate antibiotics. The stone size was calculated in mm^2 by multiplication the largest diameter of the stone by the diameter crossing it perpendicularly.

For comparative intergroup analysis of the data, Fisher's exact test, Mann- Whitney U test, independent sample *t* test, and Pearson *chi*- square test were used.

Results

Comparisons of patients' characteristics, and data related to surgical interventions of both groups are presented in Table 1. A significant difference between groups as for gender, age, preoperative stone burden, and follow-up period did not exist. Open surgery was performed on 10 male, and 8 female patients , while 10 male, and 8 female patients received PNL treatment. Mean ages for patients managed with open surgery or PNL were 41.9±13.58,

Table 1: Data of group 1 and group 2

	Group-1 (Open Surgery)	**Group-2 (PNL)**	**p**
Male/Female	11/9	10/8	0.90
Age (year)	41.9±13.58	36.22±14.3	0.21
Preoperative stone burden (mm^2)	390,72 ± 200,12	329,46 ± 249,66	0.40
Follow-up time (month)	23.65 ± 6,62	28±13.35	0.20
Stone recurrence rate at control	4/20	11/18	**<0.05**
Stone burden at control	11,77 ±26,29	30,51 ± 37,44	**<0.05**
Duration of hospitalization (day)	8.25 ± 2.38	1.66 ± 1,18	**<0.05**

and 36.22±14.3 years, respectively. Preoperative stone burden was 329.46 ± 249.66 mm^2 in the PNL, and 390.72 ± 200.12 mm^2 in the open surgery groups, respectively. Mean follow-up periods were 28±13.35 months in the PNL, and 23.65 ± 6.62 months in the open surgery group. Stone recurrence was detected in 61 % (11/18) of the patients treated with PNL, while only in 20 % (4/20) of the patients in the open surgery group ($p<0.05$. Mean stone burden in patients who developed recurrences was 30.51 ± 37.44 mm^2 in the PNL group, and 11.77 ±26.29 mm^2 in the open surgery group. Stone burden was significantly higher in the PNL patients who developed recurrences ($p<0.05$). Duration of hospital-stay was significantly shorter in patients who had undergone PNL ($p<0.05$)

Discussion

Although in the guidelines the first alternative in the management of renal stones is ESWL, for stones larger than 2cm which cannot be fragmented because of their hardness and location; PNL faces us as the first alternative (1, 2). Nowadays, the rate of open renal stone surgery has dropped down to about 1 percent (3, 4). Even if PNL operation has found such a larger field of application, still some unanswered questions exist about the issue of stone recurrence during long-term follow-ups (6-12, 17).

In studies performed, presence of a positive urine culture, and a complex residual stone larger than 5 mm further increased the risk of stone recurrence (11). In a study conducted by Zilberman *et al,* as risk factors for stone recurrence, urinary system infection, renal failure, smoking habit, anatomic anomalies, and also as the most important factor residual stone fragments were indicated(16). According to Kosar *et al,* the incidence of stone recurrence after stone surgery varies with preoperative stone burden, and postoperative stone-free rate (15).

In our study any significant intergroup differences were not found as for gender, age, preoperative stone burden, and follow-up period. Open surgery was performed on 10 male, and 8 female patients , while 10 male, and 8 female patients received PNL treatment Preoperative stone burden was 329.46 ± 249.66 mm^2 in the PNL , and 390.72 ± 200.12 mm^2 in the open surgery groups, respectively. Any significant intergroup difference was not found with respect to preoperative stone burden.

In a comparative study performed by Kosar *et al* stone recurrence rates after ESWL, and open surgery were found to be 13, and 31%, respectively. Etiologic factors for higher stone recurrence rates after open surgery were listed as increased stone burden in patients who were treated with open surgery, increased rates of culture positivity, renal tissue damage, and postoperative sedentary lifestyle led by the patients (15). Zilberman *et al.,* indicated that higher recurrence rates in patients who didn't receive any medical post-PNL therapy were related to residual stone fragments (16). Study by Assimos *et al.* found relatively higher stone-free rates in cases who had undergone open surgery (18). In our study stone recurrence rates were 61 % (11/18) in patients treated by PNL, and only 20 % (4/20) in cases managed by open surgery ($p<0.05$) Since all cases included in the study consisted of patients with solitary renal stones, lower incidence of recurrence in open stone surgery has been attributed to the removal of stones as a single piece without being fragmented. However in patients who had undergone PNL, postoperative residual stone fragments undetectable with imaging modalities cannot be avoided. Higher postoperative stone recurrence in the PNL group has been attributed to this phenomenon.

Various studies performed have found post-PNL sto-

ne recurrence rates as 0-17%, 22.3 %, 27 % and 31.4 % after 1, 2, 3, and 5 years of follow-up periods, respectively (6,9-12). In a study, post-ESWL stone recurrence was detected to be 13.4 % after an average of 2 years following ESWL (15). Still in the same study recurrence rate was found to be 31.8 % after an average of one year following open stone surgery. However in our study, after mean follow-up periods of 28±13.35, and 23.65 ± 6.62 months after PNL, and open surgery, respectively, the corresponding recurrence rates were 61, and 20 percent. In our study, stone recurrence rates after open surgery complied with the literature, while they were relatively higher in the PNL group. Higher stone recurrence rates in the PNL group have been attributed to higher regional predisposition to stone recurrence, lack of postoperative medical therapy after open surgery, and assessment of stone-free rates only with plain radiograms. Similarly, in the literature studies reporting post-PNL recurrence rates have used KUB for the evaluation of these rates. In recent publications, in the evaluation of post-PNL stone-free rates, success rates were seen to be 100 % for non-contrasted CT, and 87.5 % for KUB (19, 20). These findings have demonstrated that non-contrasted CT is the most sensitive modality in the evaluation of postoperative stone-free rates. If non-contrasted CT had been used for the postoperative evaluation of stone recurrence rates, higher recurrence rates would have been seen.

Mean stone burden in patients with recurrent stone disease in the PNL , and open surgery groups were 30.51 ± 37.44 mm^2, and 11.77 ±26.29 mm^2, respectively ($p<0.05$) However, recurrent stones in these patients were clinically insignificant without requiring any intervention.

In our study mean hospitalization periods were 8.25 ± 2.38 and 4.66 ± 1.18 days in Groups 1 and 2, respectively. Hospitalization period was significantly shorter in the PNL group ($p<0.05$). In a study conducted by Al-Kohlany *et al.* PNL was found to be advantageous with respect to shorter hospitalization period, and earlier return to work, while it had similar stone-free, and stone recurrence rates compared with the open surgery group (21). Although, in our study hospitalization period was detected to be shorter in the PNL group which was in compliance with the literature, stone recurrence rates of the patients, and earlier onset of mobilization did not comply with the literature findings.

Conclusion

PNL is a widely used treatment modality for kidney stone management recently. Postoperative stone recurrence rates might be higher in patients who underwent PNL due to stone fragments that not encountered during open surgery. However, more detailed studies are required to be able to reach more explicit information.

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